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(54) Blade Block for Electric Razors

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Specification

Title of the Invention: Blade Block for Electric Razors

Scope of the Patent Claim

In a blade unit comprising an outer blade body wherein is provided a plurality of hair guide holes placed on a thin sheet at suitable intervals, and an inner blade body for shearing off whiskers which are scooped in by said whisker guide holes when said whiskers move and come into contact with the rear face of said outer blade body; a blade block for electric razors wherein the cutting operation embodiment of said inner blade body shall be reciprocal rotation, and a plurality of blade units shall be arranged therein.

Detailed Description of the Invention

The present invention relates to a blade constitution for electric razors having a blade unit with an outer blade body that is provided with a plurality of whisker guide holes for scooping in whiskers that are placed on a thin sheet at suitable intervals, and an inner blade body such as one for shearing off whiskers which are scooped in by a plurality of whisker guide holes placed in the outer blade body when the whiskers move and come into contact with the rear face of the outer blade body; a blade block for electric razors wherein the cutting operation embodiment of the inner blade body shall be reciprocal rotation, and a plurality of blade units shall be arranged therein.

In a conventional constitution of a blade for electric razors, the motion embodiment of the inner blade thereof could be broadly divided into two constitutions as shown in FIG. 1. In one constitution thereof, the motion embodiment of the inner blade body shown in FIG. 1(a) is linear (reciprocal rotation). In the other constitution thereof, the motion embodiment of the inner blade body shown in FIG. 1 (b) and (c) is rotation. Furthermore, the rotation system thereof can be divided into one where the outer blade body 1 is structured so as to have whisker guide holes on the entire blade face shown in FIG. 1 (b), and one wherein whisker guide holes only exist on the outer periphery part of the blade surface shown in FIG. 1 (c).

The advantages and disadvantages of each will be described below. First, according to the conventional blade embodiments, because one inner blade body is enveloped by the large outer blade body 1 and one blade for electric razors has one blade unit, the shape thereof naturally becomes large and the area of the part wherein whisker guide holes 2 for the outer blade are provided increases. Because the blade shown in FIG. 1 (a) and (c) has an outer blade surface which is nearly flat, the amount of blade surface effectively making contact with the skin is very small when the blade surface is placed against skin such as on a person's face, which has complex recesses and bumps. If the outer blade area was increased just to make shaving faster for example, only the unnecessary surface which does not contact the skin would be increased and an inefficient outer blade would result.

Particularly in a blade embodiment wherein whisker guide holes are only provided on the outer perimeter of the circular blade shown in FIG. 1 (c), even if the area of the outer blade surface is increased, the lost contact in the center part would increase, resulting in a blade having little effect. Although arranging a plurality of blades in parallel as shown in FIG.

2 is currently being considered for a type of outer blade such as this one, because the blade is also circular in this case, all of the blade and the space (the hatched part of FIG. 2) 3 aligned with the blade becomes unnecessary space and the effective area in contact with the skin becomes very small. Also, the round blade in FIG. 1 (b) which has a normal dome shape had the disadvantages of the distal part of the blade strongly striking the skin and typically contacting the skin in a circular manner near the apex of the dome, and the outer peripheral part of the blade naturally become unnecessary. Looking at drive embodiments for a round blade, in the reciprocating motion shown in FIG. 1 (a), only two sides have whisker guide holes in the direction in which the whiskers are being guided, in other words only the part (whisker guide sides) shown by 4. Also, the whiskers could only be guided in one of the directions in which the whiskers grow and guiding all whiskers by only contacting the skin one time was difficult.

In the case of the rotating blade shown in FIG. 1 (b) and (c), whiskers can be guided regardless of how they grow because the whisker guiding sides are constant at all sides within a 360° range.

As described above, the conventional blade embodiment has various advantages and even though this embodiment has disadvantages, an object of the present invention is to use the advantages, eliminate the disadvantages, add more outstanding characteristics, and provide an ideal blade block for electric razors.

A detailed description based on the embodiments is provided below.

As already described above, the present invention basically has an outer blade unit having an outer blade body where a plurality of whisker guide holes is placed and a circular blade body is structured so as to shear off whiskers guided by a large number of whisker guide holes placed on the outer blade member which moves in contact with the rear face of the outer blade body, reciprocally rotate the cutting operation embodiment of the circular blade body and arrange a plurality of blade block units. FIG. 3, FIG. 4, and FIG. 5 show an overview of this embodiment. FIG. 3 shows one blade unit 6 of the present invention, where the cutting operation of the outer blade body (1) in which a large number of whisker guide holes (2) is placed, and the inner blade body which shears off whiskers being scooped in by the whisker guide holes (2) in the outer blade body which moves in contact with the rear face of the outer blade body(1) reciprocally rotate in an arc shape like the one indicated by the arrow (5) which is centered on point (A) to vibrate at a constant cycle. Furthermore, by arranging a plurality of blade units 6 like the one shown in FIG. 3, the present invention forms a single blade block (7) and increases the whisker cutting effect thereof. FIG. 4 and FIG. 5 show an example of the arrangement of blade units. FIG. 4 is a view showing a plurality of the blade units shown in FIG. 3 combined and arranged in series in the motion direction of the inner blade to constitute two sets of circles, such that a single blade block (7) is constituted when the two sets of circles are arranged concentrically with (A) as the center. Also, FIG. 5 shows an example of a single blade block (7) constituted by combining in parallel to the motion direction of the inner blade a plurality of arc-shaped blade units (6) composed of different radii centered on (A). However, the present invention does not limit the combined

arrangements blade units shown here and allows for a large number of other combined arrangements.

Thus, from an embodiment of the present invention, if one outline of the present invention, or, blade block unit has blade units in a plurality of arrangements, the blade unit shape can be made into any size. As a result, effectively placing blade units in limited blade surfaces is easy, and a variety of units can be used in a single electric razor having a variety of hole shapes, outer blades, and thicknesses between units. For example, blade units for applications from rough shaving to touch-up shaving can be constituted into a single blade block. Also, if the blade units are mutually separated and made to float and exert force vertically and horizontally, due to a constitution wherein a plurality of blade units is arranged as shown in FIG. 6, the blade units will completely fit the skin when in contact with the skin (8) as shown in FIG. 6 (a), and nearly all outer blade surfaces have the blade units (6) contact the skin (8), making it possible to effectively gather the whiskers of that part and therefore shave quickly. When comparing the skin contact state of the article in the present invention with the skin contact state of the conventional article described above, as shown in FIG. 6 (b), only a small part of the total area of the blade units (6) contacts the skin (8), and no quick shaving effect can be expected even if the blade area is increased. Furthermore, the shaving operation embodiment of inner blade bodies in a blade unit according to another outline of the present invention shall be reciprocal rotation. However, when a plurality of blade units is arranged as in the present invention to have a single blade block, the drive method of each blade unit is the problem.

In the drive method employed in the present invention, the shaving operation embodiment of the inner blade bodies was made reciprocal rotation in order to have an effective drive method with minimal loss. FIG. 7 shows an embodiment of a drive part (rotary vibration motor) for implementing the present invention. A coil (10) is wound around both vertical parts of a U-shaped stator (9), a box-shaped armature fixing frame (11) is firmly fixed to the pole part of the upper stator (9) in the coil (10), bearings (12) are provided for the fixing frame (11) in the central position between poles of the stator (9), and a drive shaft (13) is provided in the radial direction from the vibration fulcrum to form a vibrating armature (14) which is linked to the bearings (12) so as to rotate freely. Because the drive shaft (13) is directly coupled to the vibrating armature (14), the drive shaft (13) directly transmits the motion of the vibrating armature (14) and directly connecting the driven part, in other words the inner blade bodies of the blade unit (6), to the tip thereof is acceptable. In other words, similar to the conventional article shown in FIG. 8 and FIG. 9, the reciprocal vibrating motor shown in FIG. 8 (a) is commonly used when a plurality of blade units having reciprocating linear motion shown in FIG. 1 (a) is placed. The vibrating armature (14) moves as a transducer centered on the fulcrum (15) due to intermittent suction generated by the stator (9) which the coil (10) is wound onto, and the corresponding drive shaft (13) also reciprocally vibrates in an arc-like manner centered on the fulcrum (15) as shown by arrow (16). Because the blade unit (6) requires reciprocal linear motion like that shown by the arrow (17), some kind of converter is needed between the motion of the drive shaft (13) and the blade unit (6). There is some mechanical loss at this point. Unless there are many blade units, the reciprocal vibrating motor has the disadvantage of the loss leading to a doubling in the number of blade

units, resulting in a significant worsening of the conversion efficiency. Also, in the case of a linear reciprocal vibrating blade unit employing a drive method such as this one, there is only one drive direction as shown in FIG. 8 (b). As described in the disadvantages item for the conventional article, whiskers which are growing in all directions cannot be grabbed, and this drive method has the disadvantage of always having directionality. Furthermore, when driving a plurality of inner blade bodies having rotary motion as shown in FIG. 1 (b) and (c), a rotary motor is generally used, but in order to drive a plurality of blade units, the rotation force of the rotary motor shaft (18) must be transferred to the inner blade drive shaft (19) by gears as shown in FIG. 9. At this point, there is mechanical loss due to the gears. This is not a simple loss. Because gears are being used, mechanical friction noise is generated, resulting in great discomfort while the razor is being used.

Compared to a conventional drive embodiment like the one described above, if the rotary vibration motor is used to drive the blade unit according to the present invention, there will be absolutely no parts causing mechanical loss, drive force can be directly transferred to the blade, and because drive means is used wherein there is no directionality when transmitting drive force such that whiskers can be shaved no matter which direction they are growing in, an effective blade can be provided to realize a very efficient electric razor.

Joining a plurality of unit inner blades to constitute a single inner blade member is also acceptable.

[Brief Description of the Drawings]

FIG. 1 shows the conventional inner blade motion embodiment;

FIG. 2 shows a plurality of conventional blade units arranged;

FIG. 3 shows an embodiment of the blade unit according to the present invention;

FIG. 4 and FIG. 5 show an embodiment having blade units according to the present invention with a plurality of arrangements to constitute a blade block;

FIG. 6 is a phase diagram of skin contact with the blade embodiment according to the present invention and a conventional blade embodiment;

FIG. 7 shows an example of a rotary vibrating motor for driving the blade unit according to the present invention;

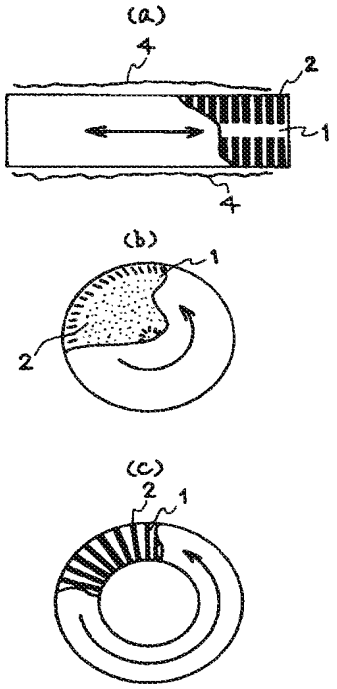
FIG. 8 shows an example of a blade unit having a conventional linear reciprocal vibrating motor; and

FIG. 9 shows an example of a blade unit driven by a conventional rotary motor.

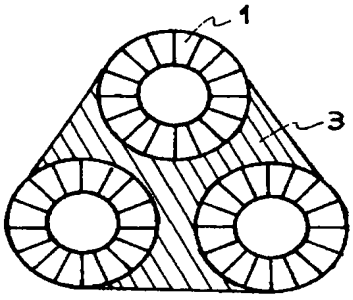
1 Outer blade body
2 Whisker guide hole
3 Space arranged between blade parts
4 Whisker guide side
5 Shaving motion direction of the inner blade bodies
6 Blade unit
7 Blade block
8 Skin
9 Stator

10 Coil
11 Fixing frame
12 Bearings
13 Drive shaft
14 Vibrating armature
15 Fulcrum
16 Motion direction of the drive shaft
17 Motion direction of the inner blade
18 Rotary motor shaft
19 Inner blade drive shift

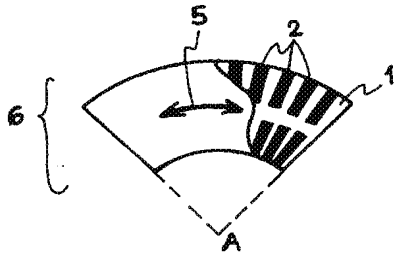
[FIG. 1]



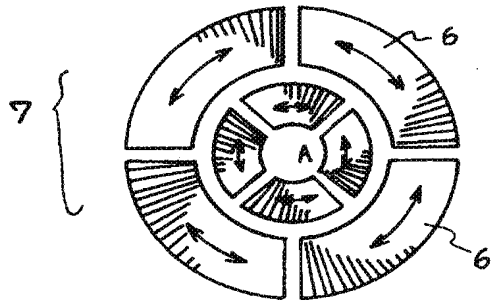
[FIG. 2]



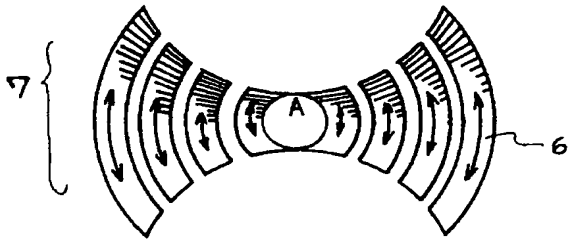
[FIG. 3]



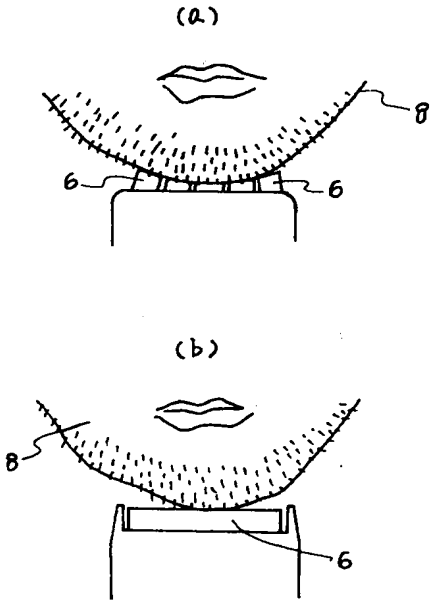
[FIG. 4]



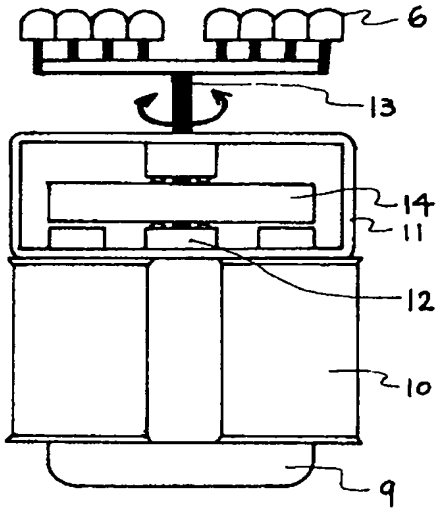
[FIG. 5]



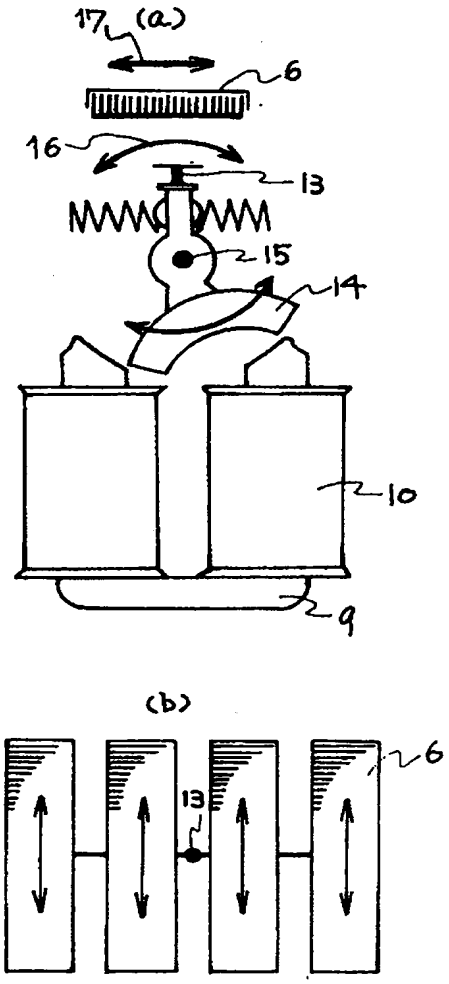
[FIG. 6]



[FIG. 7]



[FIG. 8]



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[FIG. 9]